

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
18 September 2003 (18.09.2003)

PCT

(10) International Publication Number
WO 03/077340 A2

- (51) International Patent Classification⁷: **H01M 8/00**
- (21) International Application Number: **PCT/EP03/02550**
- (22) International Filing Date: **12 March 2003 (12.03.2003)**
- (25) Filing Language: **English**
- (26) Publication Language: **English**
- (30) Priority Data:
PG 2002 A 000013 13 March 2002 (13.03.2002) IT
- (71) Applicant (*for all designated States except US*): **FUMATECH GMBH [DE/DE]**; Am Grubenstollen 11, 66386 St. Ingbert/Saar (DE).
- (72) Inventors; and
- (75) Inventors/Applicants (*for US only*): **BAUER, Bernd [DE/DE]**; Hildenstrasse 10, 71665 Vaihingen an der Enz (DE). **ROZIERE, Jacques [FR/FR]**; 58 Avenue d'Occitanie, F-34090 Montpellier (FR). **JONES, Deborah [FR/FR]**; 58 Avenue d'Occitanie, F-34090 Montpellier (FR). **ALBERTI, Giulio [IT/IT]**; Via Torelli 67, I-06123 Perugia (IT). **CASCIOLA, Mario [IT/IT]**; Via Cortonese 74/A, I-06123 Perugia (IT). **PICA, Monica [IT/IT]**; Fraz. Morano Madonnuccia 37/A, I-06123 Gualda Tadino (IT).
- (74) Agent: **RUFF, WILHELM, BEIER, DAUSTER & PARTNER**; Kronenstr. 30, 70174 Stuttgart (DE).
- (81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (*regional*): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).
- Published:**
— *without international search report and to be republished upon receipt of that report*
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

(54) Title: ION CONDUCTING COMPOSITE MEMBRANE MATERIALS CONTAINING AN OPTIONALLY MODIFIED ZIRCONIUM PHOSPHATE DISPERSED IN A POLYMERIC MATRIX, METHOD FOR PREPARATION OF THE MEMBRANE MATERIAL AND ITS USE

(57) Abstract: The invention provides composite membrane materials comprising a polymer of the state of art uniformly filled with a zirconium phosphate, preferably α -zirconium phosphate or zirconium phosphate sulfoarylenphosphonate particels. The composite membrane materials are preferably prepared starting from a solution of a polymer of the state of art and from a colloidal dispersion of α -zirconium phosphate or a zirconium phosphate sulfoarylenphosphonate. The colloidal particles are transferred into the solution of the polymer preferably by mixing the dispersion with the solution or by means of phase transfer. The membrane material is preferably obtained by removing the solvent by evaporation or by a suitable non-solvent. Besides the composite membrane materials and the preparation methods, the use of the above membrane materials is claimed as ionomeric membranes with high overall performance in high temperature, especially hydrogen, and in indirect methanol fuel cells and with decreased methanol crossover in direct methanol fuel cells.